Physics 311

Homework Set 10

1. Find the magnetic field at the center of a square loop, which carries a steady current I. Let R be the distance from center to side (see Fig. 5.22)

2. Find the magnetic field at point P for each of the steady current configurations shown in Fig. 5.23.

3. a) Find the force on a square loop placed as shown in Fig. 5.24 (a), near an infinite straight wire. Let the loop carry a steady current I_ℓ and the wire carry a steady current I_w.
   b) Find the force on a triangular loop placed as shown in Fig. 5.24 (b), near an infinite straight wire. Let the loop carry a steady current I_ℓ and the wire carry a steady current I_w.

4. a) Find the magnetic field at point P on the axis of a tightly wound solenoid (helical coil) consisting of n turns per unit length wrapped around a cylindrical tube of radius a and carrying current I (Fig. 5.25). Express your answer in terms of θ_1 and θ_2. Consider the turns to be essentially circular, and use the result of Ex. 5.6.
   b) Now take the limit as the solenoid becomes infinite in both directions and find the field on the axis.